CLAIMS:

We claim:

1. In a method for extruding a material out of a shaping device having an exit orifice, said material having a bulk temperature at said exit orifice, the improvement comprising heating at least the surface layer of said material proximate said exit orifice to a temperature greater than the bulk temperature of the material at said exit orifice.

2. In a method for pelletizing a polymer resin comprising extruding a polymer resin melt through an extrusion die assembly comprising at least one die capillary having a die exit hole, the improvement comprising heating at least a portion of said die capillary so that the temperature of the die exit portion is greater than the temperature of the polymer resin melt.

3. The method according to Claim 2, wherein the temperature of the die exit portion is about 30-170°C greater than the temperature of the polymer resin melt.

4. The method according to Claim 2, wherein said polymer resin melt does not contain a polymer processing aid.

5. The method according to Claim 2, wherein said polymer resin melt comprises polyethylene.

6. The method according to Claim 2, wherein said polymer resin melt comprises an mLLDPE.

7. The method according to Claim 2, wherein said polymer resin melt comprises an LLDPE.

8. The method according to Claim 2, wherein said polymer resin melt comprises an LLDPE having a Melt Index less than or equal to 2.0 dg/min as measure by ASTM Method D-1238.

9. The method according to Claim 2, wherein said polymer resin melt comprises an LLDPE having a Melt Index less than or equal to 1.0 dg/min as measure by ASTM Method D-1238.

10. A method of extruding a resin comprising:
    (a) providing a molten resin product;
    (b) feeding said product into a shaping device with at least one exit aperture;
    (c) extruding said product out of said aperture into a quenching media; and
    (d) selectively heating the exit surface of said aperture to a temperature above the temperature of the extruding product so as to create a thin surface of much lower viscosity at the inner surface wall at the exit of the shaping device; whereby irregular disengagement of the extrudate as it leaves the die aperture is reduced.

11. The method of Claim 10, wherein the resin is a polymer having an extrusion rate through said shaping device limited by the occurrence of gross surface unevenness on the extruded product.

12. The method of Claim 10, wherein the resin is an mLLDPE resin.

13. The method of Claim 10, wherein the resin is a polyethylene having a Melt Index less than or equal to about 1.0 dg/min as measure by ASTM Method D-1238, Procedure B.

14. The method of Claim 10, wherein the resin is an mLLDPE resin having a Melt Index less than or equal to about 1.0 dg/min as measure by ASTM Method D-1238, Procedure B.

15. The method of Claim 10, wherein said shaping device is a pelletizer selected from the group consisting of an underwater pelletizer, a strand pelletizer, and a water-ring pelletizer.

16. The method of Claim 10, wherein said aperture is selected from the group consisting of:

(a) a slit die for extruding sheet;

(b) a slit die for extruding film;

(c) an annular opening for extruding blown film; and

(d) a die for wire and cable coating.

17. The method of Claim 10, wherein an insulation layer is placed between the shaping device and said quenching media.

18. The method of Claim 10, wherein said heating of the exit surface of the aperture is sufficient to increase the lubricity of the molten resin in the shaping device without raising the bulk temperature of the molten resin.

19. The method of Claim 10, wherein the source of said heating is provided by an integral resistance heater forming the exit portion of the shaping channel.

20. The method of Claim 10, wherein an insulation layer is placed between the exit portion and the cooling media.

21. The method of Claim 10, wherein the source of said heating is an induction heater.

22. The method of Claim 10, wherein the source of said heating is one or more electrical cartridges.

23. A shaped article comprising a resin obtainable by the process of Claim 2, said shaped article having no visible die-exit surface melt fracture.

24. A shaped article comprising a resin resulting from the process of Claim 2, said shaped article having no visible die-exit surface melt fracture.

25. A pellet comprising a resin obtainable by the process of Claim 2, said pellet having no visible die-exit surface melt fracture.

26. A pellet comprising a resin resulting from the process of Claim 2, said pellet having no visible die-exit surface melt fracture.

27. A shaped article comprising a resin obtainable by the process of Claim 10, said shaped article having no visible die-exit surface melt fracture.

28. A shaped article comprising a resin resulting from the process of Claim 10, said shaped article having no visible die-exit surface melt fracture.

29. A pellet comprising a resin obtainable by the process of Claim 10, said pellet having no visible die-exit surface melt fracture.

30. A pellet comprising a resin resulting from the process of Claim 10, said pellet having no visible die-exit surface melt fracture.

31. A pellet formed by a pelletizer and consisting essentially of a polymer composition not containing a polymer processing aid and a mLLDPE having a Melt Index less than or equal to about 1.0 dg/min as measure by ASTM Method D-1238, Procedure B, wherein said pellet has no visible die-exit surface melt fracture.

32. A pellet formed by a pelletizer and consisting essentially of a polymer composition not containing a polymer processing aid and a LLDPE having a Melt Index less than or equal to about 1.0 dg/min as measure by ASTM Method D-1238, Procedure B, wherein said pellet has no visible die-exit surface melt fracture.

33. A pellet formed by a pelletizer and consisting essentially of a polymer composition not containing a polymer processing aid and a mLLDPE having a Melt Index less than or equal to about 2.0 dg/min as measure by ASTM Method D-1238, Procedure B, wherein said pellet has no visible die-exit surface melt fracture.

34. A pellet formed by a pelletizer and comprising a mLLDPE having a Melt Index less than or equal to about 2.0 dg/min as measure by ASTM Method D-1238, Procedure B, wherein said pellet has no visible die-exit surface melt fracture.

35. A pellet formed by a pelletizer and comprising a LLDPE having a Melt Index less than or equal to about 2.0 dg/min as measure by ASTM Method D-1238, Procedure B, wherein said pellet has no visible die-exit surface melt fracture.

36. A die plate comprising:
    (a) an upstream face;
    (b) a downstream face;
    (c) at least one passage having a first opening in said upstream face whereby molten resin may be received and a second opening in said downstream face whereby molten resin may be extruded; and
    (d) a heater proximate said downstream face and proximate with said at least one passage at said downstream opening.

37. The die plate according to Claim 36, wherein said at least one passage is generally cylindrical and having a substantially uniform diameter from said upstream face to said downstream face.

38. The die plate according to Claim 36, wherein said heater is concentric with said at least one passage.

39. The die plate according to Claim 36, wherein said at least one passage passes through a portion of said heater, such that said portion defines the wall of said passage proximate said downstream face.

40. The die plate according to Claim 36, further comprising an insulation material contiguous with said heater and said die plate and concentric with said heater about said at least one passage proximate said downstream opening.

41. The die plate according to Claim 36, further comprising an insulation material concentric with said at least one passage proximate said downstream face and forming at least a portion of said downstream face at said second opening.

42. The die plate according to Claim 36, further comprising an insulation material concentric with said at least one passage and contiguous with at least a portion of said heating means, and contiguous with said at least one passage at said exit opening.

43. The die plate according to Claim 36, wherein said die plate is a monolithic die plate.

44. The die plate according to Claim 36, wherein said die plate comprises a first plate having said upstream face and a second plate having said

downstream face and said heater, said first and second plates fluidically connected by said at least one passage.

45. The die plate according to Claim 44, comprising a plurality of said at least one passage and wherein said first and second plates are fluidically connected by each of said at least one passage.

46. The die plate according to Claim 36, comprising a plurality of said at least one passage.

47. The die plate according to Claim 36, wherein said die plate comprises a material selected from brass, stainless steel, and Inconel^{TM}.

48. The die plate according to Claim 40, wherein said insulation material is selected from high temperature plastics, machineable ceramics, ceramics which may be deposited by spray coating techniques, and ceramics which may be deposited by vapor deposition techniques.

49. The die plate according to Claim 41, wherein said insulation material is selected from high temperature plastics, machineable ceramics, ceramics which may be deposited by spray coating techniques, and ceramics which may be deposited by vapor deposition techniques.

50. The die plate according to Claim 42, wherein said insulation material is selected from high temperature plastics, machineable ceramics, ceramics which may be deposited by spray coating techniques, and ceramics which may be deposited by vapor deposition techniques.

51. An extrusion die assembly comprising a die plate having at least one passage including an initial, upstream zone comprised of an opening for receiving a polymer melt having a bulk temperature T_{melt}, an intermediate zone for conveying said polymer melt, and a final, downstream zone

terminating said extrusion die assembly at an exit opening whereby said polymer melt exits said extrusion die assembly, further comprising a heating means for said downstream zone whereby at least a portion of said polymer melt may be locally heated to a temperature greater than T_{melt}.

52. The extrusion die assembly according to Claim 51, wherein said heating means comprises a heater concentric with the extrusion orifice pattern.

53. The extrusion die assembly according to Claim 51, wherein said heating means is proximate said exit opening.

54. The extrusion die assembly according to Claim 51, wherein said downstream zone further comprising an insulation material concentric with said passage and contiguous with at least a portion of said heating means and said die assembly.

55. The extrusion die assembly according to Claim 51, wherein said downstream zone further comprises an insulation material concentric with said passage and contiguous with at least a portion of said heating means, and contiguous with said passage at said exit opening.

56. The extrusion die assembly according to Claim 51, wherein said passage is generally cylindrical and having a substantially uniform diameter from said opening for receiving a polymer melt to said exit opening.

57. The extrusion die assembly according to Claim 51, wherein said die plate comprises a plurality of said at least one passage.

58. The extrusion die assembly according to Claim 51, wherein said die plate is a monolithic die plate.

59. The extrusion die assembly according to Claim 51, wherein said die plate comprises a first plate having an upstream face and comprising said upstream zone and a second plate having a downstream face and said heater, said first and second plates fluidically connected by said at least one passage.

60. The extrusion die assembly according to Claim 51, wherein said die plate comprises a plurality of said at least one passage.

61. The die plate according to Claim 59, comprising a plurality of said at least one passage and wherein said first and second plates are fluidically connected by each of said at least one passage.

62. The die plate according to Claim 51, wherein said die plate comprises a material selected from brass, stainless steel, and Inconel™.

63. The die plate according to Claim 54, wherein said insulation material is selected from high temperature plastics, machineable ceramics, ceramics which may be deposited by spray coating techniques, and ceramics which may be deposited by vapor deposition techniques.

64. The die plate according to Claim 55, wherein said insulation material is selected from high temperature plastics, machineable ceramics, ceramics which may be deposited by spray coating techniques, and ceramics which may be deposited by vapor deposition techniques.

65. The die plate according to Claim 59, wherein said second plate is a retrofit part.

66. A monolithic heater for retrofitting a resin shaping apparatus having at least one extrusion die orifice, said heater having a first face to engage said at least one extrusion die orifice of said resin shaping apparatus and a

second face opposite said first face, at least one passage between said first and second faces and substantially mating said at least one extrusion die orifice, whereby said orifice and said passage are fluidically connected and whereby a molten material passing out of said at least one extrusion die orifice may be heated by passing through said passage of said monolithic heater, and means to provide electrical energy to said monolithic heater.

67. The monolithic heater according to Claim 66, further comprising an insulation material on said second face.

68. The monolithic heater according to Claim 66, comprising a plurality of said at least one passage.

69. The monolithic heater according to Claim 66, wherein said heater material is selected from brass, stainless steel, and Inconel™.

70. The monolithic heater according to Claim 67, wherein said insulation is selected from high temperature plastics, machineable ceramics, ceramics which may be deposited by spray coating techniques, and ceramics which may be deposited by vapor deposition techniques.

71. The monolithic heater according to Claim 66, said heater having a generally circular perimeter and a void generally in the center defining an inner diameter of said heater, said heater having a plurality of at least one passage, wherein the thickness of the heater between said first face and said second face is tapered to reduce the thickness progressively toward the inner diameter.

72. An extrusion die assembly comprising an extrusion die having a plurality of extrusion orifices and the monolithic heater according to Claim 27, wherein said plurality of extrusion orifices are fluidically engaged with a plurality of said at least one passage in said monolithic heater.